

PATENT SPECIFICATION (11)

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- (21) Application No. 1052/75 (22) Filed 8 Jan. 1975 (19)
 (31) Convention Application No. 432 634 (32) Filed 11 Jan. 1974 in
 (33) United States of America (US)
 (44) Complete Specification published 1 Sept. 1977
 (51) INT. CL.² B23D 51/10
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(54) CHUCK ASSEMBLY FOR A RECIPROCATING TOOL

- (71) We, SKIL (NEDERLAND) N.V., a Corporation of the Netherlands, of Konijnenberg 60, Box 267, Breda, Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to the field of devices for securing saw blades and drill bits to a tool. Specifically, in the area of reciprocating tools, such as jig saws, it has heretofore been known to provide a quick change chuck assembly for a reciprocating tool. It is another object of the present invention to provide a quick change chuck assembly which may be capable of receiving blades of different thicknesses. It is a further object of the present invention to provide a quick change chuck in which a tapered surface of a cap threadingly engaged on the chuck body operates to firmly seat a blade for a reciprocating tool in the chuck.

ERRATUM

SPECIFICATION NO 1484393

Page 3, line 79, delete BARLOW, GILLET & PERCIVAL insert STANLEY, POPPLEWELL, FRANCIS & ROSS

THE PATENT OFFICE
 24 January 1978

Bas 43502/8

- The U.S. patent to Ward, et al. No. 3,367,727 discloses a quick change oral surgery tool wherein a surgical blade is changed for another by first retracting a ball, replacing the blade, and then extending the ball into a recess which contains a blade shank with an aperture or recess adapted to engage the ball. None of these prior devices is employed for use with a reciprocating tool. Further, except for the Park reference, they do not provide the capability of easily and quickly accommodating blades of various thicknesses. The Park device is adapted to engage various diameter drills by the drill flutes. It utilizes a spring mechanism for flexing spherical detents into the drill flutes. Engaging the drill flutes, however, requires the use of a threaded bore and a conoidal recess to firmly secure the drill to the chuck for rotation.
- It is accordingly an object of the present invention to provide a quick change chuck assembly for a reciprocating tool. It is another object of the present invention to provide a quick change chuck assembly which may be capable of receiving blades of different thicknesses. It is a further object of the present invention to provide a quick change chuck in which a tapered surface of a cap threadingly engaged on the chuck body operates to firmly seat a blade for a reciprocating tool in the chuck.
- Embodiments of the present invention will now be described by reference to the accompanying drawings, in which:
- Fig. 1 illustrates a portion of a jig saw showing a quick change chuck assembly embodying the present invention;
- Fig. 2 and Fig. 3 are cross-sectional views

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(54) CHUCK ASSEMBLY FOR A RECIPROCATING TOOL

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- This invention relates to the field of devices for securing saw blades and drill bits to a tool. Specifically, in the area of reciprocating tools, such as jig saws, it has heretofore been known to secure a jig saw blade for reciprocal movement by the use of set screws which usually require special tools to change blades.
- In the field of rotary tools, such as drills, it is known to employ devices permitting the quick change of a particular drill bit or blade. For example, see U.S. patent to Blackburn No. 2,736,562 in which a drill blade is slidably received in a holder portion which includes a metal ball which is pushed into operative relation with the blade by a tapered or cammed portion; and Park No. 1,953,8830 for a rotary drill chuck.
- The U.S. patent to Ward, *et al.* No. 3,367,727 discloses a quick change oral surgery tool wherein a surgical blade is changed for another by first retracting a ball, replacing the blade, and then extending the ball into a recess which contains a blade shank with an aperture or recess adapted to engage the ball. None of these prior devices is employed for use with a reciprocating tool. Further, except for the Park reference, they do not provide the capability of easily and quickly accommodating blades of various thicknesses. The Park device is adapted to engage various diameter drills by the drill flutes. It utilizes a spring mechanism for flexing spherical detents into the drill flutes. Engaging the drill flutes, however, requires the use of a threaded bore and a conoidal recess to firmly secure the drill to the chuck for rotation.
- It is accordingly an object of the present invention to provide a quick change chuck assembly for a reciprocating tool.
- It is another object of the present invention to provide a quick change chuck assembly which may be capable of receiving blades of different thicknesses.
- It is a further object of the present invention to provide a quick change chuck in which a tapered surface of a cap threadingly engaged on the chuck body operates to firmly seat a blade for a reciprocating tool in the chuck assembly.
- Other objects of the present invention will be apparent from the remaining portion of the specification.
- According to the present invention, there is provided a quick change chuck for holding flat reciprocating tool blades of various thicknesses having engaging means thereon comprising a main channel member defining a blade receiving channel and including a first planar surface for intimately engaging said blade; a ball retaining member having an aperture therethrough communicating with said channel, said retaining member being receivable in said channel and forming a second planar surface intimately engaging said blade; a ball received in said aperture, a portion thereof extending into said channel to contact said engaging means of said blade; a chuck cap threadingly engaging said main channel member and having an internally tapered wall for camming engagement with said ball and said retaining member; said tapered wall moving said ball and said retaining member in to intimate contact with said blade as said cap is threaded onto said channel member such that the ball and second planar surface firmly hold the blade in intimate contact with said first planar surface.
- Embodiments of the present invention will now be described by reference to the accompanying drawings, in which:
- Fig. 1 illustrates a portion of a jig saw showing a quick change chuck assembly embodying the present invention;
- Fig. 2 and Fig. 3 are cross-sectional views

of the chuck assembly with a blade retained therein;

Fig. 4 is an exploded view of the chuck assembly according to a first embodiment;

5 Fig. 5 is a perspective view of a unitary chuck body according to a second embodiment of the present invention.

Referring to Fig. 1, a portion of a reciprocating tool, such as jig saw 10 is shown.

10 The jig saw operates by vertically reciprocating a saw blade 12 to cut through a material, such as wood or metal, which is located beneath a guide foot 14. The blade 12 is secured to a reciprocating plunger 16 by a quick change chuck assembly 18 according to the present invention.

15 Figs. 2 and 4 illustrate the chuck assembly 18 according to a first embodiment. The assembly includes a chuck body 20 attached to the plunger 16 and having threads 22 provided thereon. At the end remote from the plunger 16 there is formed a blade receiving channel 24, into which the blade 12 is received. As shown in Fig. 4, a ball retaining member 26 is adapted to engage the chuck body 20 and is retained thereon by a pair of projections 28 which engage corresponding slots 31. The ball retaining member 26 defines a side wall of the blade channel 24 and has an aperture 30 therethrough which communicates with the blade channel 24 when the retaining member 26 is on the chuck body. A metal ball 32 of a diameter small enough to be received in the aperture 30 is placed therein for purposes to be described.

30 A chuck cap 34 having a conically shaped portion 34a is provided with internal threads 35 for engaging threads 22 on the chuck body. The cap is hollow along its longitudinal axis and has a tapered inner wall 36 (Fig. 2). The blades 12 to be employed with the present invention are provided with means for receiving a portion of the ball, such as a circular opening, recess or dimple 38 at their upper end. The receiving means may have a diameter nearly equal to or slightly smaller than the ball.

35 Initially the chuck is assembled by placing the ball retaining member 26 on the collet body 20 and the ball 32 in the aperture 30. When there is no blade in the channel the retaining member 26 will seat fully into the channel 24 such that one face will be in engagement with the chuck body. The chuck cap is then threaded onto the chuck assembly one or two turns. 40 These assembly steps are required only initially or when the chuck is to be disassembled and reassembled after cleaning.

45 After initial assembly, it is only necessary to perform the following steps to secure a blade in the chuck assembly.

The blade 12 is passed through an opening 40 in the chuck cap and into the blade channel 24 until it strikes the rear portion of the chuck body. The chuck cap is then threaded tightly onto the body. As the cap is tightened the internally tapered wall 36 contacts the ball 30 and, with each turn of the cap, causes the ball to move into the blade channel 24.

70 As the ball moves inwardly, it contacts the circumference of the opening, recess or dimple 38 in the blade 12 (Fig. 2). When the cap is securely tightened to the chuck body the ball asserts sufficient force on the circumference of opening 38 to seat the blade firmly in the chuck assembly.

75 Replacement of a blade is easily accomplished by unscrewing the cap 34 sufficiently to permit the blade to slide past the ball and out of the channel. The insertion of a different blade into the channel is similarly accomplished. The invention can accommodate different blade thicknesses quite easily. For a thicker blade fewer turns of the cap 34 will be required to seat the ball 30 against the ball receiving means of the blade. A thin blade is secured by threading the cap further onto the chuck body.

80 Referring now to Fig. 5, a second embodiment of the chuck body is shown. The chuck body 42 is of unitary construction and incorporates the function of the ball retaining member 26 therein; it is also provided with an aperture 30 communicating with the channel 24. The Fig. 5 embodiment operates in a manner nearly identical to the Fig. 4 embodiment; however, the Fig. 4 embodiment provides access to the blade channel in the case of a malfunction of the tool or in the case of a broken blade. The Fig. 5 embodiment has a fixed width blade receiving channel 24'. Unlike the Fig. 4 embodiment which adjusts to the blade thickness by displacing retaining member 26 as necessary, the fixed channel 24' must be sufficiently wide to accommodate the thickest blade which will be used.

85 While we have shown and described 115 embodiments of this invention in some detail, it will be understood that this description and illustration are offered merely by way of example, and that the invention is to be limited in scope only 120 by the appended claims.

WHAT WE CLAIM IS:—

1. A quick change chuck for holding flat reciprocating tool blades of various 125 thicknesses having engaging means thereon comprising a main channel member defining a blade receiving channel and including a first planar surface for intimately engaging said blade; a ball 130

retaining member having an aperture therethrough communicating with said channel, said retaining member being receivable in said channel and forming a second planar surface intimately engaging said blade; a ball received in said aperture, a portion thereof extending into said channel to contact said engaging means of said blade; a chuck cap threadingly engaging said main channel member and having an internally tapered wall for camming engagement with said ball and said retaining member; said tapered wall moving said ball and said retaining member into intimate contact with said blade as said cap is threaded onto said channel member, such that the ball and second planar surface firmly hold the blade in intimate contact with said first planar surface.

2. A chuck according to claim 1, wherein variation of the distance that the chuck cap is threaded onto said channel member is arranged to control the displacement of said ball and said retaining member into the channel to accommodate blades of different thicknesses.

3. A chuck according to either preceding claim, wherein the engaging means is a circular opening provided on the end of said blade which is inserted into the blade receiving channel.

4. A chuck according to claim 3, wherein the opening is of slightly smaller diameter than the ball thereby to permit the ball to press against the circumference of the opening to seat the blade.

5. A chuck according to either of claims 1 and 2, wherein the engaging means is a circular recess provided on the end of said blade which is inserted into the blade receiving channel.

6. A chuck according to claim 5, wherein the recess is of slightly smaller

diameter than the metal ball thereby to permit the ball to press against the circumference of the recess to seat the blade.

7. A quick change chuck for holding flat reciprocating tool blades of a determined thickness having engaging means thereon comprising a channel member defining a blade receiving channel and including first and second planar surfaces for engaging said blade of a determined thickness; said channel member having an aperture through said second planar surface communicating with said channel; a ball received in said aperture, a portion thereof extending into said channel to contact said engaging means of said blade; a chuck cap threadingly engaging said channel member and having an internally tapered wall for camming engagement with said ball; the arrangement being such that when a blade is present within said channel and as said cap is threaded onto said member, the tapered wall moves said ball into intimate contact with said blade thereby to hold said blade in intimate contact with said first planar surface.

8. A quick change chuck substantially as herein described with reference to Figs. 1 to 4 or Figs. 1 and 5 of the accompanying drawings.

9. A jig saw or other reciprocating tool having a quick change chuck according to any one of claims 1 to 8 for holding reciprocating tool blades adapted to be engaged by said chuck.

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